Contrasting geochemistry of plutonic complexes of the **Peruvian Coastal Batholith** and their time of emplacement into the volcanic/sedimentary host rock of the **Huarmey-Cañete basins**

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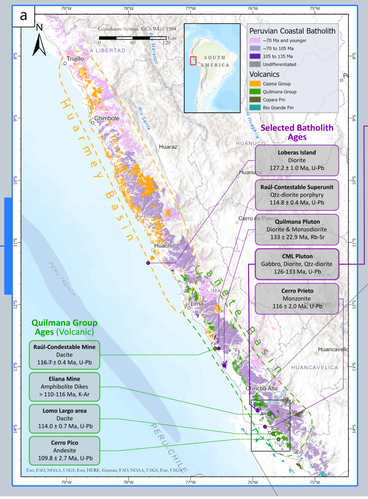
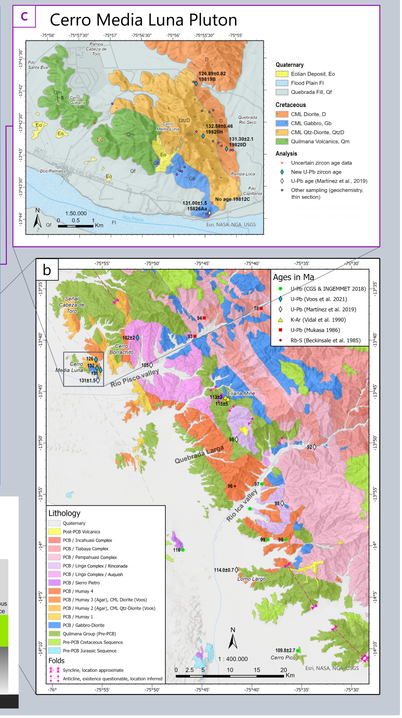
1. Introduction

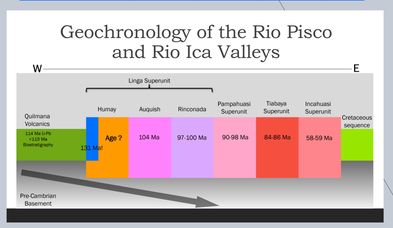
Previous studies of the Peruvian Coastal Batholith (PCB) suggested that the intrusions located north of the Rio Ica valley started about 105 Ma, that is, after the closure of the Huarmey-Cañete basin near the Aptian-Albian boundary (~113 Ma). However, a more recent 131 Ma age from a gabbro body in the Cerro Media Luna (CML) area of the Rio Pisco raised questions about the timing of the earliest intrusions of the PCB.

2. Geological Setting

Figure a: Central Area of the PCB. The PCB intruded the rocks of the two Cretaceous basins Huarmey and Cañete. **Figure b and c:** Geologic map of the PCB (b) in the Rio Ica and Rio Pisco valleys and in the (c) Cerro Media Luna area.



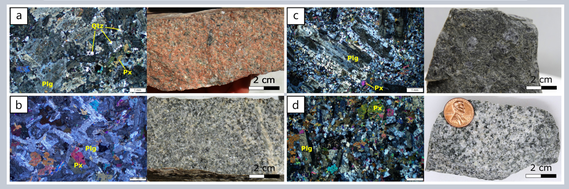




3. Petrography

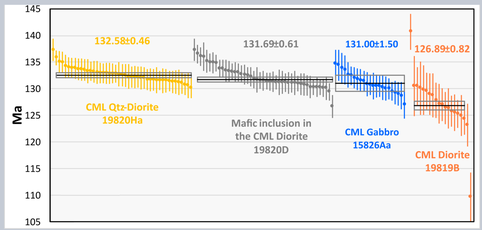
Petrographic analysis revealed **cumulate textures** of the CML pluton units. Scale bar on thin section photos represents 1 mm. Samples from the CML units: (a) Qtz-Diorite, (b) Diorite, (c) dark green gabbro sample that characterizes the Gabbro unit, and (d) light colored gabbro that is found intermingled with the dark green gabbro in the Gabbro unit.

	Figure	SiO_2	Plg	Px	Qtz	Texture	Grain size
CML Qtz-Diorite	a	62%	76%	15%	8%	mesoadcumulate	medium
CML Diorite	b	58%	76%	21%	0-3%	adcumulate	medium
CML Gabbro	c & d	54%	48-75%	22%	0-3%	orthocumulate	coarse



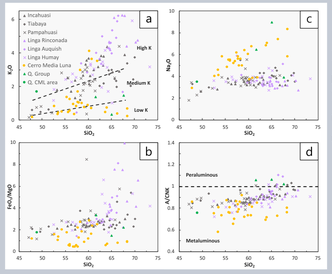
4. U-Pb Zircon Ages

Four samples dated by the U-Pb zircon LA-ICPMS method indicate a 126-133 Ma age for the CML Pluton. These ages set the CML pluton as the oldest known PCB intrusion north of the Rio Ica valley.

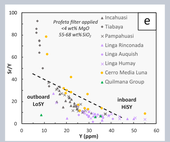


5. Geochemical Analysis

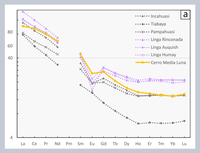
Analysis of major and trace elements and isotopes indicates that the CML pluton has a geochemistry distinct from than the other plutons of the Linga Complex and the subsequent intrusions of the PCB.



Major elements: (a) Calcic plagioclase gives low K_2O signature to the CML pluton; **(b)** Lower olivine fractionation in the CML pluton; **(c)** CML pluton has distinct positive Na_2O trend. **(d)** Lower crustal assimilation by the CML pluton magma than by other PCB magmas.

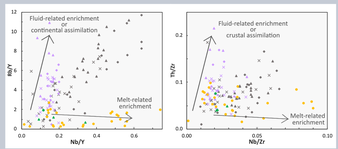


Spider Diagrams

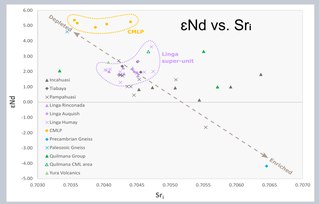


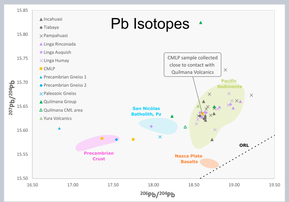
Comparing the CML pluton with the Linga Complex displays higher Sr/Y ratios in the Sr/Y vs. Y plot and lower HREE in the spidergram. This indicates a deeper magma source for the CML pluton than the Linga.

Plot Rb/Y vs. Nb/Y and plot Th/Zr vs. Nb/Zr (Kepezhinskas et al., 1997) indicate a melt-related enrichment for the CML pluton, in contrast to a fluid-related enrichment.



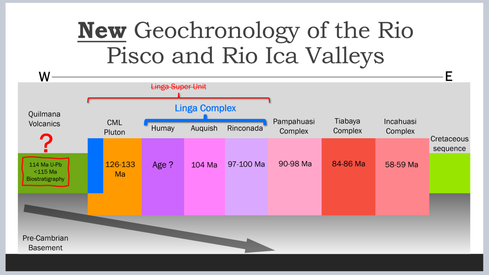
εNd and Sr_i values indicate that the CML pluton has less crustal assimilation than the subsequent PCB intrusions. Pb isotopes show crustal assimilation by the CML pluton mainly from the Precambrian and Paleozoic basement, while subsequent intrusions of the PCB are more affected by assimilation of Pacific sediments.



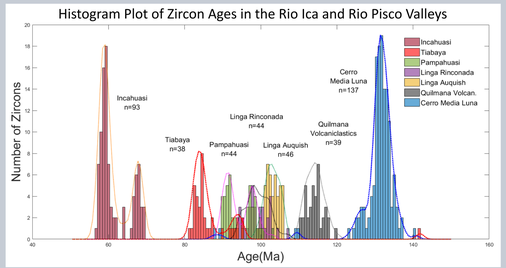


6. Discussion and Conclusions

- Based on the ~20 Ma **age difference** and the **contrasting geochemical signature**, the 126-133 Ma CML Pluton cannot be considered part of the 98-105 Ma Linga Complex.
- The ages of the CML pluton, along with ages of the Cerro Prieto, Eliana Mine, Quilmana pluton, Raul-Condestable superunit, and Loberas Island offer evidence of a magmatic arc intruding different levels of the Huarmey-Cañete basins sequence during the ~114-133 timeframe.



- This arc extends the intrusion of the PCB into the Huarmey-Cañete basins back in time by up to ca. 30 Ma earlier than previously thought.

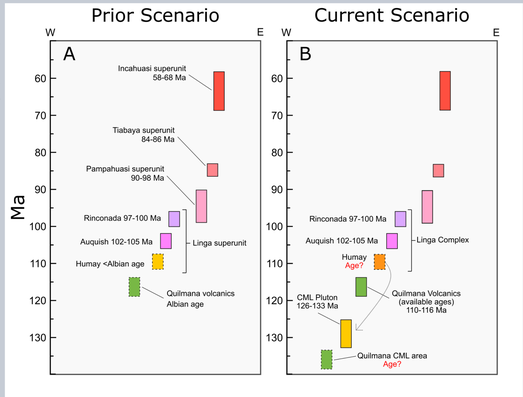


Hills of the CML Pluton

Histogram plot showing the distribution of U-Pb ages of different plutonic complexes of the PCB in the Rio Ica Rio Pisco valleys. Ages from the zircon population of the CML pluton shows an older flare-up event. The size of the histogram bars for the CML pluton and the Incahuasi plutons is due to the larger population of zircons being analyzed, n (n = number of zircons).

- Further research is required to understand the sequence and timing of sedimentation, volcanism, and plutonism along Peru's western margin during the Lower Cretaceous period.

Hills of the CML Pluton



7. Acknowledgements

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8. Selected References

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